

## 1.2 Reading Graphs and Tables

The relationship between length and area in Problem 1.1 is a **quadratic relationship**. Quadratic relationships are characterized by their U-shaped graphs, which are called **parabolas**.

In Problem 1.1, the area depends on, or is a *function* of, the length. Recall that a relationship in which one variable depends on another is a **function**. In this case, the relationship is a quadratic function. A more precise definition of functions will be discussed in later mathematics courses.

Many of the relationships you studied in earlier units are functions. For example,

- The distance covered by a van traveling at a constant speed is a function of time. The relationship between time and distance is a linear function.



- The value of an investment that grows at 4% per year is a function of the number of years. The relationship between the number of years and the value is an exponential function.



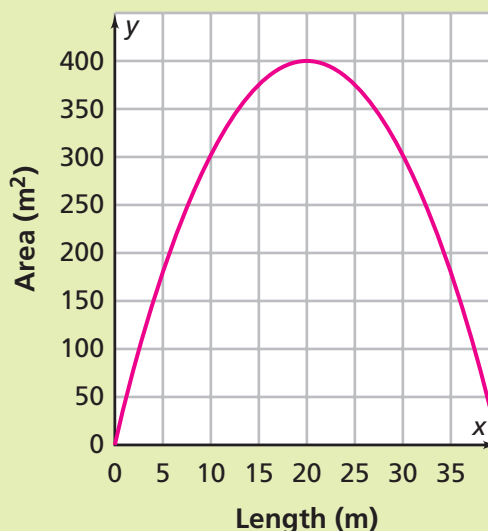
You have learned about the characteristics of the tables, graphs, and equations of linear and exponential functions. As you explore quadratic functions in this unit, look for common patterns in the tables, graphs, and equations.

## Problem 1.2 Reading Graphs and Tables

The graph and table show length and area data for rectangles with a certain fixed perimeter.

- A.**
1. Describe the shape of the graph and any special features you see.
  2. What is the greatest area possible for a rectangle with this perimeter? What are the dimensions of this rectangle?
  3. What is the area of the rectangle whose length is 10 meters? What is the area of the rectangle whose length is 30 meters? How are these rectangles related?
  4. What are the dimensions of the rectangle with an area of 175 square meters?
  5. What is the fixed perimeter for the rectangles represented by the graph? Explain how you found the perimeter.

**Rectangles With a Certain Fixed Perimeter**



- B.** Use the table to answer parts (1)–(5).
1. What patterns do you observe in the table? Compare these patterns with those you observed in the graph in Question A.
  2. What is the fixed perimeter for the rectangles represented by this table? Explain.
  3. What is the greatest area possible for a rectangle with this perimeter? What are the dimensions of this rectangle?
  4. Estimate the dimensions of a rectangle with this fixed perimeter and an area of 16 square meters.
  5. Suppose a rectangle with this perimeter has an area of 35.5 square meters. What are its dimensions?

**Rectangles With a Certain Fixed Perimeter**

Length (m)	Area (m <sup>2</sup> )
0	0
1	11
2	20
3	27
4	32
5	35
6	36
7	35
8	32
9	27
10	20
11	11
12	0

**ACE** Homework starts on page 11.